

# AVIATION WEEK

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MAR. 12, 1951

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Hens are notoriously inaccurate—they lay their eggs *anywhere*.

But not the high-flying B-36.

The world's largest bomber consistently drops its load on target—even when flying full-speed at better than 40,000 feet.

One important reason for this precision is a special adaptation of the Honeywell Autopilot. Coupled with the bombsight, the Autopilot corrects for the slightest deviations in pitch, roll and yaw axes—holds the B-36 rock-steady throughout its bombing run.

That's just one of the many special jobs which Honeywell *automatic controls* are performing for the aircraft industry. We expect to do many more in the years to come—because *automatic control* is such an important part of aviation progress. And *automatic control* is Honeywell's business.

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## How to keep fumes from bothering a plane's nose

ENGINEERS at Lockheed were faced with a tough sealing problem. Gasoline fumes from the Neptune's bomb bay fuel tanks had to be kept completely away from equipment in the forward compartment. But the bomb bay couldn't be sealed off. A seal was needed.

Lockheed wondered if rubber might do the trick. They called us B.F. Goodrich. BFG engineers built a man-made rubber curtain to cover the entire width of the lower fuselage—made of fire-resistant fabric, coated with flame-retardant

rubber. They made the curtain airtight—yet completely removable—by using a pressure sealing zipper all the way around the edge.

Then B.F. Goodrich developed zipper two overlapping molded rubber lips. They provide a 100% seal against fumes. And they make it possible to open the flame curtain in no time at all.

B.F. Goodrich flame curtains are now standard equipment on the Neptune. Besides some current applications BFG pressure sealing zippers are used for airplane doors, air ducts, window covers, control surface seals. They are

extremely flexible. They fit snugly around complex shapes—such as squares, kidneys and the like where clamps won't seal. They are available in lightweight and heavy-duty sizes. They conform right over other fabric or metal. They save space and weight.

If you have a sealing problem—or any other problem this BFG engineering might solve—get in touch with The B.F. Goodrich Company, Aerospace Division, Akron, Ohio.

**B.F. Goodrich**  
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More Revenue Airline Miles in the U. S. Are Flown With  
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# INCREASED TIME BETWEEN MAJOR OVERHAULS

...plus greater  
engine  
reliability,  
with the help of  
TEXACO



## TEXACO Lubricants and Fuels FOR THE AVIATION INDUSTRY

TIME IN . . . TEXACO STAR THRUSTERS deliver 16,000 hp on takeoff every Tuesday night. The company has 100 and counting.

CONVENTIONAL AIR LINE'S OVERHAUL CASE last year will be high with 17 engines. Right now, a Continental's scheduled major overhaul of close to 500 major parts and 100,000 hours of work. Continental has five Continental Lines and one DC-3 plane serves 12 cities in Colorado, Kansas, Oklahoma, Texas, New Mexico and Wisconsin in one, an overhaul. Right now the results of increasing maintenance volume and an increasing demand on quality. Reports of all Continental Air Line ships are delivered exclusively with Texaco Aircraft Engines Oil.

But man to tell this story is Mr. A. F. Sheth, Continental Air Lines' Director of Engineering & Maintenance. Says Mr. Sheth:

"Texaco Lubrication Engineering Service has helped Continental greatly to increase the reliability of its aircraft power plants and safely extend operating time between service periods and major overhauls. It was a specific case."

"Operation through unusually severe dust conditions was causing high heat, wash of major hot bearings. Texaco Lubrication Engineering Service carefully checked every phase of our engine operation, service and overhaul . . . analyzed many samples of oil as well as the bearing metal . . . came up with a practical answer to the problem. We are happy to report a substantial improvement in bearing condition."

Continental Air Lines uses Texaco Aircraft Engines Oil exclusively for all its aircraft engines . . . and for air-frame lubrication was only Texaco Royal Starjet Special. With the latter, cost grows now replaces the first formerly used.

You can count on prompt and efficient technical service as well as quality products when you buy Texaco. Let a Texaco Aviation Representative show you exactly what this means in terms of increased efficiency and reduced costs. Just call the nearest of the more than 2,000 Texaco Distributing Places in the 48 States, or write The Texaco Company, Aviation Division, 150 East 42nd Street, New York 17, N. Y.

## NEWS DIGEST

### DOMESTIC

Globe E. Martin Co. has secured a new production order-to-day-for the FMT-1 Martin jet subsonic plane. The new schedule doubles previously planned production. In connection with its 4-6-4 transport production program, Martin has borrowed \$4.5 million from the Reconstruction Finance Corp. and the National Industrial Bank on a \$21 million loan of credit agreement. Borrowing under the agreement now total \$3.37 million.

Army jetliner landed at Wright-Patterson AFB for Air Force evaluation. It was to go on to the Air Force to be tested as a tanker or attack aircraft. It is to be demonstrated to Air Force officials in Washington before returning to Canada.

Boeing Airplane Co. delivered the first C-97 Superfortress to the Air Force for assignment in MATS. The new C-97 model has the same gross weight as earlier versions, but has had an additional ton of payload over short range. Its landing gear is interchangeable with that of the B-30 bomber.

William H. Graham, motion picture of the New York Journal of Commerce, died in a crash of an aircraft suffered in a crash into the sea of the Navy plane in which he was a passenger. Plane crashed on takeoff from a carrier off Korea. Mr. Graham formerly was an assistant editor of Aviation Magazine, and served with the Air Force in World War II.

Leslie G. Gibson, former aviation consultant, died in Nevada City, Calif., at the age of 74.

Kenneth R. Ferguson has resigned as vice president-opérations and engineering of NAVA to become an aviation consultant. His duties formerly were taken over by Frank C. Judge.

Col. C. H. Wiley, public relations officer at Air National Command headquarters, Wright-Patterson AFB, is retiring May 31 after 34 years in the Air Force and its predecessor services. Lt. Col. Roy Taylor will be acting PIO at AMC.

New world records accepted by the Federation Aeronautique Internationale are light airplane altitude. Miss Clara Bayley, 33,000 ft., set at Miami, Fla., Jan. 4, 1951 on a two-place Piper Super Cub powered with a 125-hp Lycoming

engine, single-engine glider altitude. William S. Jones, Jr., 42,100 ft., set at Bishop, Calif., Dec. 33, 1950, in a Schweizer SGS 1-23 biplane. Flight also set a new "altitude gained" record of 10,100 ft.

Robert J. Smith is resigning effective May 15 as vice chairman of the National Security Resources Board in return to his post as president of Panair Air Lines.

Personal aircraft exports by type companies in January totaled 49, valued at \$153,375, AIA reports. In the previous month, the same number of companies exported 57 planes valued at \$171,407.

Map Gen Kenneth F. McLaughlin, commanding general of AF's Lackland, Texas, reception center-monthly criticized by a Senate committee for "misleading" reports. He has resigned the temporary job of Deputy Chief of Staff for Personnel in charge of civilian technical schools. AF denies that his resignation is related to the critical report, and says he will return to Lackland within 90 days.

First L-38 Beaver liaison plane of an Army order for four from the Fleetland of Canada was scheduled to be delivered at Ft. Rags, N. C., last week. Running time was set before the end of the month. The Air Force will order less than 190 Beavers as a result of its strong evaluation at Wright-Patterson AFB. The Army probably will order considerably more than that number from fiscal 1952 funds.

### FINANCIAL

Northrop Aircraft, Inc. reports profit of \$1,210,000 for the first six months of its fiscal year, ending Jan. 31. Bookings are highest in company's history, \$195 million.

Reynolds Aircraft Co. reports profit of \$655,165 for the year ending Oct. 31, 1950, as sales of \$12,317,377. Sales dropped about 52.5 million, chiefly in the airplane division, but profit still was considerably greater than 1949's \$558,852. Jan. 31, 1951, backlog exceeded \$29 million.

Capital Airlines reports net profit after taxes of \$5,342 for January, first year in the company's history that it showed a profit in that month. Operating revenues were \$1,057,375, and operating profit was \$76,023.

## AVAILABLE NOW! dependable RADIO NAVIGATION AIDS

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### Red, Green Dual ADF Indicator

Two inch fluorescent dial with large, easy to read, compass graduations. Mounted in standard instrument panel. Model 2711. Also available under C.A.A. Type Certificate No. 4842. Weight 300 grams. Also available (Type Certificate) 2712, with 2 1/2 inch (Model ADF-50).

TYPE CERTIFICATED  
2711-2712 Radio Compass Receiver



Radio Compass with 400-42 Receiver. 28 inch - 16 inch - 4 inch Radio Compass mounted under Type Certificate No. 4842. Also C.A.A. requirements for standard air service are fully complied. Model 2711-2712. Weight 300 grams. Also available (Type Certificate) 2712, with 2 1/2 inch (Model ADF-50).

Model ADF-50, ADF-52 Type Certificate No. 4842. Weight 300 grams. Also available (Type Certificate) 2712, with 2 1/2 inch (Model ADF-50). Available for immediate delivery.

### AVIATION ACCESSORIES

performance  
C. A. A. Type Certificate No. 4842  
TYPE CERTIFICATE NO. 4842

## Load-sensitive ROTORette



The ROTOette approaches the status in avionics for a two-point entry system known as its unique load-sensitive feature.

Mission is controlled precisely by adjustable mechanical limit stops. The adjustable load-sensitive limit switches are designed whenever the sensor enters reaches the limits of mechanical travel to overcome the maximum permissible load. This automatic provides two normal characteristics in dependable operation of video, detectors, etc., up to 50 such periods maximum operating load.

1. Accurate processing of the device driver
2. Elimination of damage from pressure or control

See condensed literature in 1961 I.A.S. Aeronautical Engineering Catalog or write for Bulletin 111



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## SIDELIGHTS

### Congress

Rep. Torgue's special committee which now gives \$60,000 to investigate alleged abuse in GI training programs has no place at this time for looking into aviation schools.

... A big drive is on in Congress to set up a small defense plants corporation, which would get private contracts from Defense Dept., and parcel them out in subcontracts to small business. Defense Mobilization Week says it won't work. That stomach buster of the single G-5 flag international airline, Sea Swifter, now waits for the proposed "in academic" team? He won't push that bill that has not automatically introduced with others left over from last session.

Sen. Lyndon Johnson's pre-graduate committee will release a report for this month on manpower shortage at Air Force and Naval training bases, it has already accused USAF of "gross" in handling the crash of military at its Lackland Tex., base before they could be carried by the other services.

... An increase in the mail postage this year looks unlikely. The Post Office didn't ask for it in its request for postage boom.

### Airlines

Northeast President Cook Hunter discounts report NWA wants to sell its Strata system to USAF, then lease them back to fly the Pacific military run. He counters that if NWA disposed of any equipment it would be its Machin 3.0. Another one-way spokesman told Aviation Week the 20th might be sold south of the border.

Skid America will probably change its name, it's considering Skid Air Freight. The company is looking for more and freight planes. Different classes report an early decision in the New York bankruptcy case. They believe CAA will follow its customer's recommendation and grant a certificate to New York Airways, Inc. A 110 mph tail wind pushed a Northwest Washington to a new, unofficial record of 1 hr. 41 min. Mile 2 from Anchorage to Seattle, for average ground speed of 616 mph over the 1160 mi., at 24,800 ft. The ship flew at normal horsepower setting, a record 30 passengers. ... An American jet has circled several cities of its employees from Hong Kong.

### Industry

AIA reports difficulty by virtually all companies in obtaining aluminum steel and magnesium fittings, due to lack of materials especially for flying stock. ... Hercules Hughes in 1962, not against RJC for distribution of contract terms, says he has spent \$17 million of his own money on the Hughes Ferry boat, in addition to the \$1.1 million put up by the government. Further news, Hughes Aircraft is spending \$300,000 each month to prepare the ship for further flight tests. No date for the next flight has been set. Bell was filed in Houston by Hughes Tool Co., asking \$1,713,017 due under contract terms with RJC.



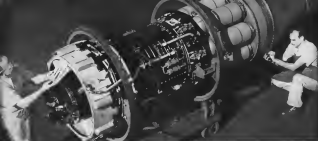
SUB HUNTER-KILLERS, INC.—A Commencement AF-25 subkiller (left) looks simply, its large open bomb-bay doors exposing an unutilized weapon. While waits of the subkiller being loaded give us a point. Note the tail wheel. Above is a view of the AF-25 Hunter with wings folded around a light tower during 1960. The large hinge under the fuselage is a radio-scanning radar. Its large door opens sufficient side effect to accelerate firing of secondary stabilizing line to the left. Both models are in legitimate production at Rockport, N.Y.

## Military Aviation Picture Highlights

RAF PICKS PRIZE—The F-16 (right) side by side two-into has been chosen by the RAF as its new standard fighter. The competition was heavy, with over 33 designs submitted by various British manufacturers. The F-16 is in two versions, Mk. 1 (background) being the Armstrong Siddeley Ghost of 600 hp, the Mk. 2 (foreground) with the F100, Alva Leonides. Mk. 1 has 149 hp, top speed, Mk. 2 does 173 hp.

SARRE MEETS CANUCK—Two of Canada's most important fighter projects join for a portrait. The North American F100A, later shown last month, took a world's speed record of 570 mph, the Avro Canada CF-108 is a 650-plus thrust all-weather fighter. The Silver is being built by Canadair in Montreal.





Latest production model of B-4 J4F is to be installed in USAF planes in J4F-33. Unarmamented, it packs more power into the standard J4F frame size. Air Force has not yet released thrust but has indicated it is in excess

## IN THE NEWS

# NEW ENGINE NEW TURBO NEW LAB



New turbocharger permits longer ranges, heavier payloads in today's transport aircraft through greater power, lower fuel consumption, and greater simplicity. Now on test with Pratt & Whitney B-450-C engine, it can be adapted to any engine of similar size.

of 5000 pounds. Anti-icing, reverse polarity ignition, and a new compressor having higher efficiency, greater airflow, are main features of J33.

As specialists in every type of aircraft gas turbine, General Electric offers you a complete line of powerful propulsion units. Turbojets, turbofans, turbochargers for piston engines are available to suit your specific needs. Forty-five years of experience are your assurance of quality and dependability.

For aircraft powerplants that keep ahead of the times, call your General Electric aviation specialist or write: Appointments Department, General Electric Company, Schenectady 5, New York.



Full scale compressor test stand in new Aircraft Gas Turbine Laboratory at Lynn, Mass., can run tests simulating altitudes up to 70,000 feet, temperatures to -1200°. The lab, newly opened, is dedicated to research of Dr. Sanford Ross, newly planner in aviation.

## AIRCRAFT GAS TURBINES

GENERAL  ELECTRIC

GE-40

## WHO'S WHERE

### In the Front Office

L. L. Wade has been named vice president and chiefing head of the newly created Electro-Mechanical division of North American Aviation. Dennis will handle design, manufacturing, development and production of electronic equipment and coal oil guidance systems for missiles and aircraft. Besides new NAA vice president is Charles J. Gelles. He will be general manager of the company's new Columbus division which will make B50s and A-14s. Wade, who has been in charge of NAA's Aerospace Laboratory, will continue to direct (but not actively) guided missile and nuclear engine program. Gelles, who joined NAA in 1955, was previously with Douglas Aircraft.

Alfred B. Bennett has been made vice president in the records relations division. He will be in charge of the company's records relations with the Navy. He will be in charge of the company's records relations with the Navy. He will be in charge of the company's records relations with the Navy.

Don T. Shaw has been appointed assistant director in Test Products, Inc., as planning for the new test products. He will be in charge of the company's test products. He will be in charge of the company's test products. He will be in charge of the company's test products.

Charles E. Widenius and Donald E. Widenius have been named vice presidents of Utah Shipways & Tool Corp. Widenius was in Utah in 1945. He is now in Utah. He is now in Utah. He is now in Utah.

Richard D. Cunningham has been made vice president in charge of engineering, research and development for Industrial Standard General, Inc. He has worked for the firm on and off during the past five years.

### Changes

Carl Werten has been made vice manager for Aero Design & Engineering Co. V. G. Zinner has been named director of industrial security for General Electric. Robert T. Wrenn has been named general manager in charge of Globe Corp.'s plants in Illinois, Wisconsin, and California.

Harry D. Housh is purchasing agent for the newly formed Washington Electronic Tube Company, with headquarters in Elmsford, N. Y. George B. Bailey has been appointed production manager of Pacific Northwest's Manufacturing division.

William E. Woodruff has been made assistant chief of research at Northrup Aircraft. C. V. Johnson has been appointed manager of the laboratory, in charge of Radio Products division. Gus C. Gables has been appointed manager of aircraft and related units in Los Angeles. He is now in Los Angeles.

Scott Patterson was named American Airlines public affairs director, his present post. American-Gulf Airlines is director of publicity, coming from a post in public relations director in U. S. News & World Report.

## INDUSTRY OBSERVER

Most serious for the large jet engine products program recently announced by Allison and Chevrolet for the Allison J35-A23 engine is the Boeing B-47C jet bomber. The B-47C is to be powered with four of the J35-A23s along in single pods under the wings. Not until recently was it finally decided that the new Allison engine, rated at nearly 10,000 lb. thrust, would be used for the production version of the four-jet bomber.

Latest purchaser of a Convair 440 is United Aircraft Corp., which has ordered one plane for research transport and experimental service testing. Plane is powered with Pratt & Whitney R-2800-CB-86 engines, and Hamilton Standard three-blade Hydromatic propellers, both CMC products.

Opening time between overhauls for the Allison J33 turbojet has now been stepped up to 500 hr. by Air Materiel Command. The J33 is the first American jet engine to be overhauled for a 500-hr. interval between overhauls, and four engines have already gone the full route, the manufacturer states.

No. 2 Convair XPYV-1, which is due to fly shortly, will be designed as a long-range reconnaissance plane. But the small production order which Navy has already given Convair for XPYV long-range transports, developed from the XPYV-1, will not be changed. It is not the transport order may be increased as a result of a trend toward flying long transports indicated as the recent British reports that the 10-engine 140-ton Saunders Roe turboprop Proteus flying boats are for RAF Transport Command.

Latest use of Fiberglas reinforced plastic for structural materials in the new experimental Hiller Harvest concept helicopter, which is fitted with a fuselage slatted with the glass plastic material.

British sources say that the English Electric Canberra light bomber is designed to carry a bomb load "as heavy as that carried by the more conventional four-engine piston bomber," indicating that USAF may have another stone-bomb carrier in the Canberra that Glenn L. Martin Co. is going to build.

Latest gimmick in wire harness is a radio guided liftboat developed by Air Materiel Command. Into the A-14 light liftboat dropped by parachute from an B-29 aircraft and rescue plane has been incorporated a low-frequency receiver which activates controls on the boat. It switches a low-frequency transmitter control box operated from the plane by signaling from the plane the operator can, in sequence, start the engine, slide gear and start to right or left.

Reports that Aero Canada is intending to deliver further work on the No. 2 jet engine, at West, respectively, have been discounted by the company. It is pointed out that work on the No. 2 plane has been slowed because of materials problems. Meanwhile No. 1 jet engine is due for a visit and demonstration for military authorities at Andrews AFB, Washington, and Wright-Patterson AFB, Dayton, any week now.

Aero Design and Engineering Co. is accepting deposits in excess of \$1 million for the fast production models of the Aero Commando light transport engine, which is scheduled for delivery February 1958. Company beginning in September at a price of \$15,000.

Results of the USAF intercept competition for the first time specifically designed to cause an air-to-air missile are expected to be made known to the industry competition early in April.

Development of the Curtiss-Straight light helicopter has been taken over by Saunders-Roe, at Southampton, and a British Ministry of Supply contract. Flight tests are now being made with a Shorter Mail, C, powered by a Shinkler's Cirrus engine.

## Washington Roundup

### Navy Spokesmen Afraid?

Conspicuous are starting to wonder whether Naval aviation, which took a thorough mauling in the famed R-56 investigation, now so thoroughly cured them that it does not put out news even if it ought to.

Naval aviators, back in 1949, were important at the institutions of a Naval air arm intended to see patrol and warfare, close land attacks and enemy land bombardment—naval-logistical Navy aviators, in the opinion of military observers. The aviators' emblem taking a big bite at, and perhaps eventually swallowing, Air Force's logistical missions, long-range strategic bombing. They lastly displayed a joint unity to announced its long range plans for the program. Their tactic, published as the B-16 investigation, was negative. Defense's international strategic bombing, directed USAF's ability to do so. The aviators were severe critics for Naval aviation, more enthusiastic among congressmen and the public for USAF.

Today, Naval aviators expect complete satisfaction with a Naval air mission for below what the Joint Chiefs of Staff, in 1948, and was a "positive" mission. After former Secretary of Defense Louis Johnson's drastic cutback of Naval spending, more drastic than his cutbacks in any other element of the military, they are now enthusiastic over a "build-up" that Washington observers say, "will be."

The "build-up," authorized after the President's declaration of a national emergency, amounts to this:

Joint Chiefs of Staff set late 1952 as the "target date" for readiness for attack war. The target strength appeared—not yet implemented with funds—for Naval striking six percent of that point is approximately 15 percent below the Naval air power that the Joint Chiefs of Staff, three years ago, wished down as essential for "percentage" increase in a troubled, but still peaceful world.

The Joint Chiefs of Staff then included Adm. Louis Denham for Navy, Gen. Omar Bradley for Army, Gen. Carl Spaatz for USAF.

There three top military men set down a 70 percent USAF and a 12-percent Army as essential percentage requirements in 1949. Logically, under the "emergency," build-up to a 95-percent USAF and a 24-percent Army by late 1952 have been approved, but aviators observe in Washington point out that illogically, a core spending Naval air build-up hasn't been given.

These observers point out that events since 1948 point to a need for more Naval air power, not less. A direct international war with Russia was then the over-riding concern. That meant even holding concentration on long-range strategic bombing—a mission Naval aviators wanted to edge into the USAF's.

U.S. knows now that its enemy's engagement in an all-out war will be with Russia. That Gen. Dwight Eisenhower, Secretary of Defense Gen. George Marshall, and other military leaders with complete access to intelligence reports, have put off the date for that engagement—no longer as the U.S. wishes in preparation with international borders for as long as 20 years.

In the meantime, war would have military side well rely heavily on Naval power hold dominance in the Pacific, hold the Mediterranean and the sea surrounding Europe, meet outbreaks at any of numerous trouble spots, requiring, outside of the arena for transport. In addition, Russia's all-out submarine construction pro-

gram dictates more emphasis on sub-sea warfare. Naval aviation—patrol planes and light-to-heavy attack—on two-thirds of that mission, with the sub-sea carrier the third.

Despite this apparent outlook for a greater and for Naval air power than was ever contemplated in 1948, Naval air power is being held down for below the minimum the JCS and was essential then. The details:

Joint Chiefs of Staff Denham, Bradley and Spaatz, called for Naval air power of 24 carrier groups, including 12 carriers, and 16,700 operating first-line assets, three years ago, for peacetime.

Now, Joint Chiefs of Staff Sherman, Coffey and Vandenberg have approved a build-up in Naval aviation—to meet threat war by 1952—to only 15 carrier groups, including 27 carriers, and only 8,000 operating first-line assets.

Navy now has only 4,000 first-line operating aircraft—less than half of the 1948 "minimum" for peacetime.

Subdued Naval aviators state they "cannot" in the program. Some congressmen ask "Are they afraid?"

Observers say it'll take more for Navy to reach its target of 8,000 operating planes by late 1952. The story: Last July after Korea, JCS set a 7,775 plane goal by late 1952 for the Navy. Navy said it would need 18,832 planes primarily to meet the goal.

But JCS decided it wanted to approve funds for 1957. Navy plans only Baker's Rear Adm. A. M. P. plans could not in Congress that the 40,000 planes from Secretary to meet the goal—but he didn't ask for more funds.

Three years ago, the Chinese Government attacks in Korea, and the JCS had request for more money from Congress. JCS—but the request didn't include funds for the Navy's 475 plane deficiency.

Naval aviators didn't complain, though. Some aviators observe that they showed satisfaction that Naval aviation was being allowed some funds for expansion of aircraft facilities—to produce planes investment in the future.

Funds for the 475 planes came in the 1951 bill, plus additional planes for the modestly increased 8,000 goal, may soon become available—but around June, at the earliest.

Conspicuous on the Armed Services and Appropriations Committees of the House and Senate cases, said that USAF's Chief of Staff, Gen. H. H. Vandenberg, ever endorsed the USAF program approved by the Joint Chiefs of Staff without adding a "but"—"but I would like to see it sooner."

From Secretary of Navy Francis Matthews, however, they can draw no "but." Though they have taken more steps of assistance covering him, they said no hint of dissatisfaction with JCS program for the Navy.

Last December's defense appropriations bill didn't include funds for the 475 plane deficiency in the Navy's program.

### Times Change

Sentators critically looked into him last December. Defense Secretary Gen. George Marshall realized, but not giving them the green light for an all-out build-up of the country's defense. He only wanted "partial" mobilization.

Marshall cautioned last week "that today the atmosphere is quite different. Now the questioning is not how much more do we need but why are we adding to what we

# AVIATION WEEK

## Rentzel to Get Key Mobilization Post

As Commerce Undersecretary, he takes over coordination of transportation.

Presidential assignment of a young and vigorous aviation spokesman to a high place among transportation planning was hailed in industry circles last week as a move that would place air transportation on fairly equal terms with other types for the first time since mobilization began.

Mr. Truman's selection of Delos W. Rentzel, 41, as Undersecretary of Commerce for Transportation would promote him from the increasingly important chairmanship of the Civil Aeronautics Board and place him in a key post in the mobilization framework.

The Rentzel assignment followed an executive order (102171) of Feb. 25, which President Truman gave the Commerce Dept. and the Inter-State Commerce Commission separate powers to direct transport mobilization.

■ **Rentzel's Job.**—The chief air transport mobilization control mandates given the Commerce Dept. as the order, and expected to fall under Rentzel's administration, direct it to:

• Announce and analyze data as both Defense Dept. and civil air transport needs.

• Meet requirements of military and civil air transport by issuing permits and covering them out.

• Administer plans in the military when needed and substitute remaining control of the military in acute military, aircraft and aircraft.

• Determine traffic priorities and related needs "subject to such policies and orders as the Defense Production Administration may prescribe."

• Act as chairman for materials and manpower, fuel, construction, operation, maintenance of civil air transport systems and facilities.

• Set up any agency or agencies the Commerce Dept. may need to do these things.

• Use the services of the CAB and other such federal, state and local agencies required.

The same general directives went to Commerce last time as Transportation Undersecretary for shipping and ship construction and to the Commerce Secretary of the ICC for and, highway, inland waterways transport and storage facilities.

The President ordered the Secretary of Commerce, ICC Commissioner, and Secretary of Defense to cooperate "to achieve the efficient mobilization of inland and ocean transportation."

A working agreement was understood to be in effect, at least temporarily, under which Rentzel would have mobilization assignments in his new post as air, mobilize, construct, shipping and transport. Rentzel's civil and administrative and Senate confirmation are yet to come, although the selection has been announced.

Some observers wondered whether the new position would give him as much of a green light as transport mobilization is supposed to be the act.

Those close to the situation saw a potential conflict with the mobilization assignment already held by Defense Transport Administrator James K. Duff. Duff was created by Executive order under sponsorship of the ICC, strong champion of the military. Until Rentzel's new assignment, this step clearly gave the military the upper hand in defense mobilization.

Under the new assignment, the work distribution of mobilization is making it more equitable, with equal to its co-organization.

■ **The Plus Side.**—One plus factor for aviation is Rentzel's familiarity with both regulatory and administrative sides of civil aviation. He and Donald Nease, Civil Aeronautics Administrator, have been in close touch since their early transportation work together at CAA and Noyce at conducted a likely success for Rentzel in CAB chairman (see p. 11). In other posts, Nease will be a considerable help to the new Transportation Undersecretary.

Rentzel is a former CAA Administrator, and previously had been president of American Radio, Inc., and an employee of American Airlines. His assignment is the latest development in the rapid growth in importance of aviation's role in the mobilization effort, described in *Aviation Week* Mar. 5 (page 77) and earlier.

■ **Speed-up.** The job of Commerce head of transportation reportedly has been Rentzel's aim for some time, but a longer stay at CAB has been planned.



NEW PRIZE TO RENTZEL: CAB chairman (left) steps up to Undersecretary of Commerce, and Delos W. Noyce (right) is in line to take over the top post in CAB.

He has been there since last summer by his new post, he will succeed Maj. Gen. Philip H. Hinson, who has been recruited as our ambassador to Costa Rica.

Rentzel's friends say he expects to rely heavily on staff work and noncommissioned members from CAA and Noyce in making his final decision.

### Minimum Radar Screen Complete This Year

Minimum radar screening system to guard against possible enemy air attack upon the United States will be completed this year, according to Air Force Secretary Thomas K. Feltner.

He emphasized, however, that this system must not be considered by any means as an adequate air defense warning system. The Air Force, he pointed out, looks upon the project only as a minimum set.

Congress last year authorized approximately \$100 million for construction of a system which would provide a guard for the West Coast, northern U.S. borders, and the East Coast. These funds were also to be used in establishment of an Alaskan network which would be completed some time in 1951.

Canadian government officials are also working to these a series across





The Glenn Martin Co. has announced that in addition to its new Canberra production program, Air Force had subleased the company to "purchase one of its two experimental XB-51 light thrustjet bombers, for use as a production prototype," indicating that the XB-51 is likely to be scheduled for production after further testing.

Fuller pointed out that the possibility of ordering both gloves into single production would complicate the production process. He emphasized that while the first few models of the B-72 would be produced at Seattle, mass production, if undertaken, would be at an inland city (Aviation Week Feb. 26). Fuller would not amplify the subject further.

Crew compartment is reported to be safe, including relief crew for long distance missions. Design specifications of the NB-52 turbojet version give the pilot a slight edge in speed over that found in the jet-engine version of the B-36.

**5-Sweepwing B-16**—Familiar configuration of the current production B-16 changes greatly in Consolidated Value's sweepwing version as it indicated in Avanceur Wynn's artist conception of the plane (Avanceur Wynn Nov. 20, 1990). Overall dimensions remain substantially the same, but both wings and tail are sweptback at 35 deg. Footage is the same as it used in current production B 36.

If enough J-57 powerplants are not available when needed for installation aboard the B-35, it is understood that a temporary switch to the General Electric J-47 engine will be made to permit flight testing of the plane as soon as possible.

Turboprop powerplants which have been discussed in connection with the Boeing winged B-56 are the Pratt & Whitney T-58 and the Allison T-40, both expected to develop approximately 5700 shaft hp. But it is likely that a production winged B-56 would have an even newer powerplant, more powerful than either of these and not yet announced.

Canberra Visi-Finkletter also disclosed during his press conference that the Air Force had decided to buy English Electric's Canberra light jet bombers, and that it would be built by the Glenn L. Martin Co., Baltimore. This does not mean, he emphasized, that we are getting the Mach X-51. It is still undergoing accelerated testing and is being contained in a development plane program.

The Caberns, which Secretary Feltner has officially pronounced to be the best available jet light bomber, last week was at Langley AFB, Va., in demonstration before Tactical Air Command members at the Senior Officers Board and their staff officers.

Flight performances have indicated that the plane has on one of the shortest rates of turn of any U.S. high speed jet. Its short and stubby wings have a very low aspect ratio and a 45 degree sweepback. The wings, however, have a relatively large area providing a relatively low wing loading, for better maneuverability, and better handling for shortlanded landings.

The first batch of Republic F 100 jet fighters was delivered to the French government about two weeks ago. The government expects to send out 40 fighter equipment for its French fighter squadron by end of calendar year 1955.

The first batch of Republic F-84 'jet fighters' was delivered to the French government about two weeks ago. The government expects to sound out jet fighter equipment for its French Republic squadrons by end of calendar year 1951.

Presently there are 23,000 Air Force officers and men stationed along this strategic line of air bases. Aircraft strength is estimated at about 750 combat planes of all types. Most of the bombers, tanks and utility types are of World War II vintage.

Consequently, as a hedge against large cash demands, Douglas has arranged for credit from five banks.

## FINANCIAL

### Subsidy Shapes Air France Course

A plane for a franc sounds good, but carrier cannot build replacement reserve if it has no depreciation.

While not on the agenda of the bilateral air transport discussion now in progress between France and the United States in Paris, the question of subsidies will influence ultimate decision items.

Pan American World Airways encountered stiff opposition from the French when it sought to lease Paris under the terms of its acquisition of American Overseas Airline. This entry was permitted only after lengthy months of negotiation and strong diplomatic representations. With IWA, PAA is now the second U.S. carrier serving Paris.

► **Competition Fears**—The French are fearful of the competitive consequences resulting on their own national airline, Air France. Moreover, with Pan American flying nonstop alongside Air France's Concorde, the French are apprehensive that they will be at a competitive disadvantage on this prime transatlantic route.

This factor led the French to limit frequencies of service of American airlines in France and it remains a key issue underlying the current bilateral discussions.

In a broad sense the philosophies of private enterprise and state intervention are in conflict as this now is being resolved by Air France, an instrument of national policy of the French, it heavily subsidized by its government. This is a practice followed by all European countries in supporting their individual national air carriers. Then subsidy support shapes the nature of airline operations and competitive practices of the European carrier and it is strongly evident in the case of Air France.

The large clouds of subsidy payments the recently of being both the cause of Air France's competitive disadvantages as well as raising artificial barriers seeking to protect it from American carriers.

The western and full extent of Air France's subsidized support, along with that of other foreign carriers, remains among the hottest international subjects. While one even compares public subsidies and detailed accounts of other operations, their foreign counterparts do not.

The multi-financial prop of Air France remains virtual assurance of complete financial support from its

government. This is done by providing the necessary capital through stock or loan and, when necessary, guaranteeing securities issued to the public. But this is not all. The extent of indirect aid is substantial and appears in various forms. For all practical purposes, Air France is 100 percent state-owned. All operating decisions are reinforced by the government treasury.

► **PA France A Phase**—In 1946, the government acquired 46 Langsdorf, Trans-Atlantic transports of French manufacture, and turned them over to Air France at a cost of one franc each. A total of five Langsdorf airplanes were also acquired by Air France at the same cost of one franc each. The 15 Lockheed Constellation is service were obtained through ECA funds.

At first glance, ignoring all of this equipment without any cost would appear to place Air France in a tremendous competitive advantage. But whatever initial gain was achieved was soon lost.

To the first place, the planes of French manufacture were not really owned by the airline but were built help encourage a government-owned industry and Air France was a socially natural result. Of greater consequence is the failure of Air France to develop replacement reserves for its equipment. In depreciation, as can hardly be charged against airplanes "purchased" at one franc each. It is this lack of reserves seriously accumulated through depreciation charges that has proved embarrassing to Air France and is an important element motivating the French to seek protective barriers around its airline.

Nonetheless, the French government is continuing the flow of other transport types, the Aérospatiale and the Boeing 707. Presumably, these planes may be turned over to Air France as were the Langsdorfs and Lockheeds.

► **The American Way**—By contrast, American carriers do not have the same compulsion to accept the product of any aircraft plant, unless they feel it meets their particular requirements. It is a free play of economic forces which not only encourages the development of new designs but also encourages the development of new designs. This includes the sale of service at a profit and with operating expenses including the necessary pass-

ages for depreciation, thus developing an operational economy.

Another form of indirect aid occurred Air France by its government as the assurance of losses on foreign exchange in blocked sterling or "tail" currency rates. The airline usually turns over such currency to the French treasury for local utilization in the country involved, retaining credit in full.

The development of Air France followed the success of other French airline enterprises with a predominant orientation of heavy subsidization. As of Dec. 31, 1949, the capital stock of Air France amounted to 10 billion francs (333 francs equal \$1.00). This entire capital was provided by the government. In addition it had long-term debt of 4,114,785,143 francs as of that date, also advanced by the government and largely representing overnight French debentures through ECA financing.

Air France is better than most Civilian airlines, scheduled for delivery in August of this year. In this instance, the purchase is being financed by a five-year credit extended by French banks and guaranteed by the government. It is significant that in the 1950 ECA grants to all countries, France obtained more than half, some 547.2 million, largely for Air France.

► **Various Subsidies**—Direct subsidies are very large in operating Air France, but not easily defined. For the period from Sept. 1, 1946, to Dec. 31, 1949, direct grants amounted to 2.6 billion francs. This, however, is not all. There are various agreements with separate missions which add to the revenues of the airline. Under certain trade agreements in the French colonial empire in North Africa, for example, the company is assured of a definite volume of business for contract.

One international airline receives their government support through U.S. mail preferences. They do not share the indirect aid and profits as popular to their counterparts in Europe.

U.S. mail subsidies in the international field appear to be very small relative to the collective aid obtained by Air France and the other foreign international airlines.

The current situation surrounding the bilateral discussions in France also highlights the fact that as airlines, once entrenched in heavily subsidized operations, is forced to seek an increasing measure of government support. Not one a government, once committed, intend to have its instrument of national policy fail. This begins more controls and artificial restrictions designed to prevent its entry. This approach clashes with the American concept of free enterprise which has pushed commercial aviation throughout the world to its most advanced state of development. —Bill Albrecht

# More time for creative drafting!

Look at just two of the ways Kodagraph Autopositive Paper saves valuable drafting time for the Cleveland Crane and Engineering Company.

The checker as you'll be able to take another short-cut in your work... turn hours of costly retouching time into hours of creative drafting time.



## 1 Time saved... when drawings must be combined

Many clients order custom jobs requiring electrical components which Cleveland Crane must obtain from outside vendors. Ordinarily, the design for several of these units must be combined in one drawing before original drafting can begin. This used to be a tedious retouching job—but no longer. Now, desired sections of the vendors' prints are reproduced as a composite print on "Autopositive" Paper. Exposure in a direct-process machine, processing in a standard photographic solution. The result is a sparkling positive intermediate... with dense photographic black lines as a clean, evenly translucent base. On it, the draftsman simply adds the necessary wiring detail... producing a new "master" in a fraction of the old time.

## 2 Time saved... when drawings must be changed

New designs must replace old detail on complicated switch assembly drawings. And Cleveland Crane is doing the job the easy way, instead of making a new drawing—which would be 80% retouching—they reproduce the original on Kodagraph Autopositive Paper. Then the draftsman removes the unwanted lines from the intermediate print with acetone fluid... and draws in the new detail. Result: a brand-new "original" is ready in three hours instead of 3 days. Ready to produce sharp, legible shop prints in the desired number.



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**GUIDED MISSILE** using brain work for defense... provide protection against attacking enemy aircraft. Designed and "flight-proven" by Fairchild, this surface-to-air missile is another development geared to the requirements of our Armed Services.

Hooping on radar impulses reflected by attacking aircraft, these missiles improve in accuracy as they approach their objectives.

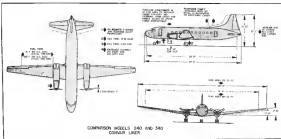
Designed and built by the Fairchild Guided Missiles Division working closely with the Navy Bureau of Aeronautics and Naval Research Laboratories, this is an example of combining the practical and theoretical to obtain superior results.

ENGINE AND AIRPLANE CORPORATION  
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## AERONAUTICAL ENGINEERING



## Convair Triplets: 240, Turboliner, 340

Well-proven 240 developed into turboprop and piston powered 340. Advances possible with 501 engines.

Turboprop transport research is being pushed by Consolidated Vultee Aircraft Corp. and Allison and Aeroquip's divisions of General Motors Corp. as a team.

Basic vehicle is the Convair-Lear, now in the Allison 501-A1 (T-38) turboprop equipped with Aeroquip's propeller. Result of the combination is

the Turboliner. The accompanying photos show installation details of the engine and propeller in the plane.

► Data for industry—Schedule for the Turboliner includes 50 hours of flight test by Convair followed by experimental flight tests by Allison at Indianapolis, where extensive service tests will be made in order to evaluate turbo-

prop transport operating conditions.

The data gathered by Allison will be made available to Convair and later the plane is scheduled to perform as a demonstrator for the industry, the aircraft manufacturers and airline operators. It may also be used for airline regular route cargo haulage to supply support for the operators and airline leaders.

► Turboprop Anticipated—Meanwhile, Convair has gone ahead with its improved version of the Convair-Lear,



TURBOLINER aircraft house three engine mounts, one aft and two forward of cabin.



ALLISON TURBOPROP gets its through cowling in aircraft bay, all under six through cowling in aircraft bay. All fuel, electrical, control lines have quick-disconnects.

Performance	
Climo weight	45,000 lb.
Maximum payload	31,650 lb.
Tire capacity	5,700 psi
Average speed supported at 16,000 ft. [1200psi] Climo maximum weight 41,200 lb.	330 mph.
Kings with 320 sq. ft. fuel tank	
[1200 lbs.] [90 mph.] (90 mph.) (48 psi) and baggage	140 at mid.
Weight 812 lb.	
Maximum CAAK operating altitude with one engine operative (see construction page 4-7)	
Maximum CAAK maximum weight 45,000 lb. (Climo construction page 4-7)	7996 lb.
Required CAAK runway length for takeoff with 45,000 lb. at 36, (wet run) 2400 ft.	4012 ft.
Required CAAK Runway Length for Landing, sea level, maximum Landing Weight of 44,500 lb.	4212 ft.
Weights	
Weight empty	28,680 lb.
Max landing gear	44,100 lb.
Max taxiing gear	45,000 lb.
Max nose fuel	45,000 lb.
Max taxiing max loading	44,900 lb.
Max taxiing power loading	43,810 lb.

Wing Group							
Wing Area						910	ft <sup>2</sup>
Span						105	ft
Root chord						110	in
Tip chord						40	in
Taper ratio							1
Incidence slot						4	deg
Aspect ratio							12
Mean aerodynamic chord (MAC)						98	in

Min. body circumference	
Height	9.5-9.8
Width	9.5-10.0
Length	79-83
Height over tail (5 point position)	17.5-19.0
Tired, mean winds	25.0

horsepower ratings	Torque Power per Engine (hp)	Critical Altitude (ft.)	Engine Speed (rpm)
Takeoff wet	1469	4000	2700
Takeoff dry	2053	6000	2700
Takeoff dry (alt.)	1990	8000	2800
Max. Continuous			
Low Motor	1800	5500	2600
High Motor	1700	6500	2600

3 Model, automatic full-functioning and reversible  
Thermostat

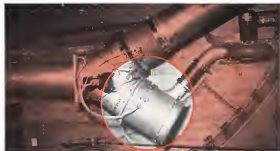
Cavair reports that the 340 has been designed, aerodynamically and structurally, with ample allowance for all anticipated increases in turbo-prop power.

► **340 Features**—Latest report gives those details for the 340.

Debit-Off Gross Wages	Payments	Adjusted
Pay Company Ltd.	41,500	41,500
Pay Company, Total Pay		41,500
	41,500	41,500
Max Altmann on Mfg. Materials-Engineers Total on Mfg. Materials- Engineers	37,357	37,357
Max Altmann on Mfg. Materials-Engineers Total on Mfg. Materials- Engineers	3,143	
Max. GAR Operating Expenses with Operating Expenses-Engineers, Total on Mfg. Materials- Engineers	32,338	34,499
Required GAR Balance Total on Mfg. Materials- Engineers, Total Pay on Mfg. Materials- Engineers	4,141	4,230
Required GAR Balance Total on Mfg. Materials- Engineers, Total Pay on Mfg. Materials- Engineers	70,000	70,000
Ball Bond on Mfg. Level Materials-Engineers Total on Mfg. Materials- Engineers	93	93
*Amounts Reported on Ground Line		

Valued Gross Weight	\$5,309
Empty Weight Empty	\$0
Empty Fuel	\$0
Empty Oil	\$0
Unloaded Wet Weight	\$5,309
Empty	\$0
Oil	\$0
Fuel	\$20
Oil	\$10
Engine	\$5
Valve	\$0
Fluids (Oil, Fuel, Oil)	\$35
Wet Weight and Chemicals	\$5,344
Costs Equipment	\$0
Fuel and Oil and Grease	\$35
Fuel and Grease	\$35
Fuel and Grease	\$35
Operating Weight Empty	\$5,344
Empty Fuel	\$0
Empty Weight Empty plus Fuel	\$5,344
Empty Fuel	\$0
Maximum Loading Weight	\$5,344
Maximum Weight Limit	\$5,344

Added wing area means the integral fuel tank capacity 190 gal. over that of the latest 240 version, to give a total of 1700 gal.



**JOY** AXIVANE<sup>®</sup> AIRCRAFT FANS  
warm airborne troops before take-off

• **Key dimensions** build such ducts to the exact requirements for which they are needed. Each fan, therefore, is custom-engineered for highest efficiency. For many purposes, such fans can be supplied from the extensive line already designed. Such slight and two-range sizes available. Optional features include straight or flared sides, bonded or flanged connections, color finishes, anodization, and coated interiors where required.

Here are some of the many uses for Jay AXIVANE Aircraft Fans: Windshield de-icing, windshield or wing de-icing, cabin heating, cabin ventilating, cockpit heating, cooling radio and electronic equipment, cooling voltage regulators, oil cooling, gear-box cooling, instrument cooling, air recirculation, and high-altitude oxygenator heating.

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IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GAITHERBORO, ONTARIO

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Triple-alloy steels containing nickel offer designers the following triple advantages:

1. **OUTSTANDING PERFORMANCE**—Strength and toughness, resistance to wear, fatigue or shock, to meet a wide range of requirements, as demanded by design.
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3. **ECONOMY**—resulting from standard compositions precisely graded to match the engineer's needs.

Service records established by triple-alloy steels over a period of years show that they are giving excellent results in many diverse and exacting applications.

The many standard combinations available permit accurate and economic selection for specific uses.

Because of their many advantages, these triple-alloy steels warrant your careful consideration when planning new or improved designs. We shall be glad to furnish counsel and data upon request.

**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street  
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**TURBOPROP'S PROOP** enters spinner through exhaust providing blade pitch change thru full trheer to reverse. Air scoop on nozzle tip is held with two inches.

140 (9 ft. 5 in.) Length is 79 ft. 2 in. The 14 is more than the 160's and is distributed as exhaust nozzles for 35 in aft of the wing and 16 in forward. This extra space allows 4 additional seats for a total of 41 passengers, as it can be said for cargo stowage.

The 140's pressurization and air conditioning system will include a new type engine-driven expander with two-speed operation. Air conditioning

during ground operation also will be possible.

The accompanying tabulation gives performance data for the Turboprop as presently conceived (with 800 Allison turboprop engines) and estimated performance for the plane with advanced 901s, together with a weight breakdown for its early version (240-8) of the Convair-Lewis 140 with advanced 901 engines. Weight figures for the 140 with 901s should be comparable.



**MISSILE FLIGHT SCANNERS**

These optical tracker-type, three-dimensional tracking rocket missiles to get a photographic record of the test flight. The

device are normally operated and are used by the General Electric Co. at the AF long range proving grounds, Cooke, Va.

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Indicating Pyrometers

for temperature testing  
in the laboratory  
or in the plane...

Constructed with the same care as our aircraft temperature indicators, these pyrometers bring "military quality" to the test engineer.



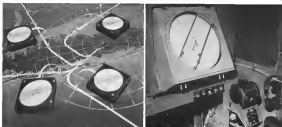
**MODEL 889W** shows two basic and standard features: the "arming" feature for read setting on the "arming" feature, which eliminates errors. Shown in rectangular frame can be 1/2 inch square with one 1/2 inch mounting hole for uniform temperature. Made in rugged frame having with accurate thermocouple materials.



**MODEL 889** left shows two basic type movement as our standard system. Model 889B right shows two basic type movement as our standard system.

**MODEL 889B** right shows two basic type movement as our standard system. Model 889B right shows two basic type movement as our standard system.

**STANDARD RANGE-AS Models**  
TEMPERATURE  
Size to 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2100, 2200, 2300, 2400, 2500, 2600, 2700, 2800, 2900, 3000, 3100, 3200, 3300, 3400, 3500, 3600, 3700, 3800, 3900, 4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700, 4800, 4900, 5000, 5100, 5200, 5300, 5400, 5500, 5600, 5700, 5800, 5900, 6000, 6100, 6200, 6300, 6400, 6500, 6600, 6700, 6800, 6900, 7000, 7100, 7200, 7300, 7400, 7500, 7600, 7700, 7800, 7900, 8000, 8100, 8200, 8300, 8400, 8500, 8600, 8700, 8800, 8900, 9000, 9100, 9200, 9300, 9400, 9500, 9600, 9700, 9800, 9900, 10000, 10100, 10200, 10300, 10400, 10500, 10600, 10700, 10800, 10900, 11000, 11100, 11200, 11300, 11400, 11500, 11600, 11700, 11800, 11900, 12000, 12100, 12200, 12300, 12400, 12500, 12600, 12700, 12800, 12900, 13000, 13100, 13200, 13300, 13400, 13500, 13600, 13700, 13800, 13900, 14000, 14100, 14200, 14300, 14400, 14500, 14600, 14700, 14800, 14900, 15000, 15100, 15200, 15300, 15400, 15500, 15600, 15700, 15800, 15900, 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EDSW MAP indicates direct distance data of microwave system.

REMOTE control station in C-34 for navigation system tests.

## Air Force Tests New Navigation System

All-Weather Flying Division begins flight studies for ANDB on Sperry 5600mc. Rho-Theta system.

Details of a new navigation system for control of dense air traffic within airport terminal areas were disclosed by two radio engineers at the Sperry Gyroscope Co. at the recent 39th annual meeting of the Institute of the Aeronautical Sciences in New York City.

George B. Litchfield and Joseph Lyman, who one year ago described the microwave omnirange which forms the base of the new cross-bearing-distance system (Aircraft Week, Feb. 20, 1959), reported these developments.

- Basic system, installed recently at Wright-Patterson AFB, is being flight tested under the Air Navigation Development Board's airship project and evaluation program by USAF All-Weather Flying Division.
- A new kind of distance measuring equipment, based on phase measurement principle, forms an integral part of the 5600mc omnirange.
- Clutter instrumentation, in addition to the usual area and distance indicators, consists of a pictorial computer display which plots the airplane's position and projected track by electronic method on a map representing the terminal area.
- EMIL, in addition to other facilities included in the system, uses new ground transmitter, search receiver, and radio channel employed by omnirange.

• **Evaluation Program**—Basic system, part of a stress of Sperry navigation projects in the 1000mc frequency band sponsored under AF contract since 1946, has been placed under cognizance of ANDB's Navigation Area Evaluation Center supervised by the All-Weather Flying Division.

The USAF Sperry navigation system, along with a 5600mc landing system, is designated a "common system" (part of the Research and Development Board). It is one of several development systems, which began originally under AF sponsorship, being considered as ANDB's "ultimate program" for the common system.

According to ANDB, "ultimately all available navigational and navigation" will be conducted by All-Weather Flying Division at Wright-Patterson AFB.

All-Weather's job is to determine which, if any, of the many aids being created in the defense industry are suitable for development into the ultimate network of the common civil-military system of air navigation.

No further how processing a new navigation aid may seem during its early development, it must pass its flight evaluations at All-Weather before it can be considered by ANDB as candidate for the ultimate system.

• **Design Objectives**—The new navigation system is intended as a foundation upon which a coordinated control system for air traffic can be built. Ultimate goal of its designers is to provide a traffic control system which not only is adequate for classifying traffic, but also capable of being expanded to meet future demands of an air transport industry which is growing faster each year.

Principal design objectives of the system are:

- **Conservation of equipment**. Development of system components is carried out recently so that they can be built into each other.
- **Conservation of frequency spectrum**. Putting all system facilities in the same frequency band (300mc) permits separate components to use the same radio channels. Use of continuous-wave channels makes narrow band channels possible.
- **Accuracy**. Lyman and Litchfield emphasize accuracy as a primary operational requirement that any terminal area navigation system must meet. It is not to be less than 6 ft. in traffic.

Most exacting requirement for accuracy is the spacing of aircraft on final approach. For example, if it is desired to land aircraft approaching at 120 mph at 50-sec. intervals over a 10-mi. continuous approach track, Lyman and Litchfield's calculations show that a ground speed accuracy of  $\pm 1.2$  mph.



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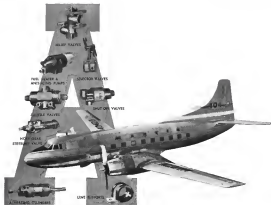
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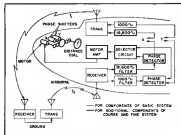
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BANC course and line distance measuring system

would permit the separation of aircraft to get in as low as eight seconds at the touchdown.

A mile-long, ground speed accuracy requires  $\pm 50$  ft. accuracy in distance measurements. If the ground speed accuracy is measured to  $\pm 1$  mile, it is an effort to allow sufficient time for con-

stantive action, and if this measurement is to be made in 15 sec., distance must be measured to an accuracy of  $\pm 25$  ft. **New DME Technique**—The new DME employs a new technique for measuring distance with radio waves. Most existing types of radio systems—radar, loran, 100mc DME—which can

play distance measurement, measure the transit time of radio pulses to determine the distance. In contrast, the new system uses the phase difference between transmitted and received continuous wave modulation.

The phase difference between the transmitted and received signals is proportional to distance to the ground station.

In the instance of an airplane 95 mi. from the ground station, a constant 1000 cycle time transmitted to the ground station and returned to the airplane produces a phase difference of exactly 1 cycle, or 360 deg. At  $\pm$  this distance, or 9.5 mi., the phase difference is 36 deg.

Magnitude of the phase difference also depends upon the time frequency used.

An 18,600-cycle time will produce a 1-cycle difference for every 7 mi. as the aircraft travels away from the ground station.

Loran and Loranoid use both frequencies in their systems. The 1000-cycle time provides a coarse measurement of distance while the 18,600-cycle time comes at a fine answer at precise measurement.

The course-line system promises high accuracy. It is  $\pm$  1 mile in accuracy phase differences to  $\pm 1$  degree at Loran and Loranoid point out, the

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theoretical accuracy can then be good to within 10 ft.

The system explained that a third decade of measurement can be added "without complicating the system much over the single frequency system," says almost all equipment needed for a three-frequency system is available in the two-frequency system. "Then, an increase in accuracy in almost anything required operationally can be achieved, including the extremely high accuracy required for fuel approach," they add.

Multiple Aircraft Use—Added to the new DME technique is a technique which makes the system capable of handling large numbers of aircraft. The plane distance technique without further de-

velopment would limit use of the system to only a few aircraft. Several aircraft transmitting a continuous tone signal simultaneously on the same frequency channel would jam each other and make the system unusable.

This problem is overcome by scheduled time sharing of aircraft transmissions. All aircraft share the same frequency channel at scheduled intervals. In practice, each airplane occupies the radio channel for only 1/50 sec. once in every 5 sec.

Transmission time is scheduled in proportion to each airplane's altitude position as determined by the course range. An airplane east of the station transmits its distance 1.5 sec. after

a plane north of the station uses the system. A plane south uses the system 1 sec. after the plane at north.

This scheme makes 500 separate time intervals available in the system. During each interval, each airplane can make 310 consecutive measurements of its distance. Rate of change of distance can be established by the system after four or five of these measurement intervals.

Capacity of the system is further imposed by such factors as site memory. If a distance measurement is missed, a check in the system maintains the rate of change of distance and advances the series according to the established rate.

The site memory will cover missed measurements for as much as 30 sec. The system "will not advance under the highest possible attention rate," according to Lyman and Litchford.

Pilot's Indicator—Distance and bearing from the navigation system are presented to the pilot on the airplane as a map indicator. The indicator works in a graphic computer which permits the pilot to fly any required combination of straight and curve tracks in the terminal area.

The indicator is considered by its designers to be a form of integrated information because it combines several pieces of information into a single picture and solves at a glance many of the plotting and navigation problems that have kept pilots busy calculating manually since the time airplanes first began to fly.

Besides plotting bearing and distance of position on the map, the indicator also shows magnetic heading, ground track, drift, bank deviation, and position relative to landmarks and other data in the area. It also provides a sense of ground speed, linear speed, and turning speed on the flight path. Most important, the pilot can see what maneuvering problems are coming up on his flight path.

Maps, printed on facsimile paper, cover a 10-in. area around the ground station. Distance and time data from the navigation system move as electronic stylus or bug on the map. The stylus, which represents the airplane and its position in the area, automatically tracks over the map as the airplane maneuvers in space. As the stylus moves, it records by invisible means the airplane's ground track on the map.

The required flight track, indicating the pilot where to fly, can also be shown on the map. From the stylus and the track it records, the pilot can see his airplane's deviation from the required flight track, his drift angle, and the bearing of the plane relative to the track. The designers add that the stylus will show track deviations as small as a few hundred feet in the 30-sec. area.

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## PRODUCTION



OPEN EPS hold parts for assembly, now working on F-99 rocket fire action

## Put Parts Where They're Needed

That's Northrop's way, and the Scorpion manufacturer has found it saves lots of production time, money.

An easy reach is paying off on Northrop Aircraft, Inc.'s F-99 Scorpion production line.

Engineered spotting of parts for assembly has given a "time-saver" line stock rig system that already has shown economies as high as 17 percent over conventional stockpiles installed in six months of operation. Industries are that with stopped-up Scorpion production, an additional 25 percent saving may be achieved.

**Production Study**—Northrop determined that each Scorpion would require about 70,000 fabricated, purchased and government-furnished parts. To work out a plan to get the material into the hands of the assembler with the least possible delay when it was needed, a Northrop team of production, industrial engineering, accounting, material and plant engineering personnel pooled ideas with manufacturing control specialists.

The solution came up with a scheme to abolish stockroom handling and apply a line stocking system in gradual stages as F-99 production shifted to full.

**One Step**—Philosophy behind the new system is that the assembler won't have to take more than a single step to pick up the next part. Of course, no large assemblies like fuselages are out, but transfer space has been cut to a minimum.

Racks and parts bins have been in-

stalled along the fast assembly line in the major component assembly department and in subassembly as close as possible to the related operations.

And areas previously used for stock rooms have been used for production activities.

**Special Racks, Rosters**—Racks are of uniform construction, depth and color. Special units hold odd-shaped, newly designed parts, such as hydraulic tubing, ideas, common items and ducts.

In nearly all cases, bins and racks are marked to "line" space adjacent to gage and assembly stations.

Fabricated parts are created directly in subassembly. Subassemblies are fed directly to the assembly line. Purchased parts and government-furnished parts (not travel directly from warehouses to the subassembly shop or to the production line).

**Storage Control**—A manufacturing control representative staffs each production area, stocking parts in the racks and reporting shortages.

Reduction of stockroom shortages is partly has been greatly simplified. Because material part personnel are aware of shortages by daily observation of assembly parts bins, lack of parts or material are identified well in advance of need. Thus, it is a simple matter to locate critical shortages from parts already delayed in fabrication or delivery.

As a result, expeditors are able to

deviate their total effort toward elimination of critical shortages. And with the line stocking system, shortage reports have become concise and effective in contrast to the traditional bulky impractical report resembling hills of snow.

**On-the-spot Posting**—Assembly parts bins formerly used for stockroom operators are posted at each parts rack. A diagonal pencil mark opposite the part number indicates that the part has been placed in the rack.

The production line has "large bin" bins. He rarely draws a diagonal mark in the opposite direction when the part is withdrawn.

When signs in fabrication or subassembly create an overcrowded condition with some items, they are held in disposal areas temporarily, but number of these items have been held at a minimum.

**System Experience**—As personnel gain experience in the line stocking system, they can take on a larger number of parts racks gradually, to increase the supermarket savings.

For example, in one department three control points were established originally and kept busy servicing production. As the personnel became more familiar with conditions it was found that one control point could be eliminated by dividing its responsibilities among the other two.

**Storage Roster**—And Northrop reports that better bookkeeping results when parts are checked in the open. Parts hidden on stockroom shelves often are stored in a sloppy manner.

Valuable parts, particularly government-furnished, are stored in locked cabinets, lockers and drawers, having control personnel having the keys.

Northrop says that line of parts has increased at a tremendous, speeding up growth that would occur under stockroom systems.

**More Data**—The new system also facilitates operational control. Recently, when Northrop moved its work assembly line over the weekend from one building to another, only loaded parts racks were transferred with the gage. Features and partially completed assemblies, assemblies reporting to the new location on Monday morning were able to take up where they had left off the previous Friday.

Northrop has found that line stocking has paid off in reduced costs and increased production efficiency.

## Aeroquip Expands

Golden Air filling at 40 feet at Aeroquip Corp., Jackson, Miss.—backlog will be valued at \$5 million compared with about \$1 million only in 1950—that the company is adding about

# FIRST



**WORLD AUTO SPEED RECORD**—594 mph—held by John Cobb. On our mix he clocked 400 mph... tested over air-track. To ensure top engine performance, Cobb used Mobiloil.



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de Rosa and other air pioneers. Today, Mobiloil Aero has the approval of leading aircraft engine builders—supplies rapid Army and Navy specifications—is available at headquarters of U. S. airfields.

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## EQUIPMENT



PAN AMERICAN's Miami Base is the world's largest airplane maintenance facility.

### PanAm Base Levels Work Peaks

"Equalized service," with specific jobs assigned to specific terms, stabilizes labor force, cuts costs.

By George L. Chaslin.

Miami-Pan American World Airways has undertaken the enormous job of leveling the numerous peaks and valleys existing in its huge mid-south-eastern Overhaul Base.

Called "equalized service," PAA's new maintenance philosophy is a form of continuous maintenance. Goal is to accomplish a standard and equal number of man-hours of work on its aircraft each time it arrives at the base. Attainment of a completely equalized maintenance program on a scheduled basis means an equally stabilized labor force, with some of the usual seasonal layoffs and temporary hiring.

In partial operation on Pan American Overhaul Base, Inc. (DO-6) since September, 1959, equalized service has shown these encouraging results, according to R. C. Zima, PAA's aircraft system superintendent:

During the last quarter (September-December), no increase in cost of overhaul was apparent despite an occasional fluctuation, normally associated with a new system. Now, as the second quarter, it is apparent that at least a 5 percent saving will accrue. An additional 5 percent is forecast for the succeeding quarter. Zima was confident to predict how much more economy the system might reflect after that. But the predicted 10 percent saving should well more than justify the new service.

Zima felt that the system's most

important advantage is the establishment of a constant, stabilized work force, with little requirement of hiring, firing or shuffling up for peak work loads. Thus and the fact that functions and activities which as a team are important seasonal loads, Zima says. A majority to the stabilized work force and high output is faster, better work and low labor turnover, reflecting greater economy.

► **Teamwork.** Not only do the functions and man-hours work as a team, each group is assigned to one particular part of the airplane. Each time a plane comes in for service, the same team works on the same part, irrespective of date. Result is extreme ease in taking responsibility for work, well or poorly done.

The small teams, because they work continuously on a given part of an aircraft, become extremely familiar with their duties and work at high speed.

A standardized work load permits more accurate planning and therefore greater overall availability. Thus, no more, results in better customer performance. Since the system has been in operation, no time performance has improved.

► **Constant Status.**—This is the current status of PAA's equalized service program.

The DO-6, on which the system is most advanced, now has no 1, 2, 3 and 6 months required. These were preferred at 62, 117, 135 and 1102 hr. respectively. 363 is to be brought

into the series on the 5, 6, 7, and 8 months performed at 1300, 4000, 6300 and 8800 hr. PAA is working on that.

This is how equalized service works: When a plane comes into the hangar, the number of men hours to be expended on it during a fixed elapsed time has been predetermined. Of total time allotted to the plane, a certain part is allocated to fixed service items performed each time the day comes in to the base. The balance is spent on longer service items which can be done in urgent.

Efforts are made to avoid duplication of work. When inspections, for instance, are completed first on one wing face on the other, no inspection does will not have to be repeated.

Of the five different types of aircraft scheduled at the base (Boeing 747, Boeing 707, Boeing 720, Boeing 737, Boeing 767) the most equalized service was the Boeing 747. On this day, the one 1, 2, 3 and 6 months were equalized.

Another method PAA uses to distribute work loads evenly is by having well assigned to the industry—the establishment of non-mandatory modification programs and inspection work for objection periods.

► **Planning.**—PAA's planning organization at Miami was able to prepare a copy for the three Coast Airlines and the Stratofleet PAA acquired through the merger with American Overseas Airlines that not a single extra man had to be hired to handle the aircraft. And the 17 large, four-engine planes were integrated into PAA's fleet almost overnight.

There was a surprising factor. To avoid much dissatisfaction of AGM, Boeing with those of the Atlantic and Latin American divisions, the Stratofleet were exchanged for an equal number of Pacific Alaska division planes thereby conforming to PAA specifications.

AGA standards will apply to the Pacific Alaska division planes until modifications is practiced according to Zima.

To coordinate planning with "our four life airlines," as Zima describes it, supervisory personnel plan a maintenance meeting every morning.

Here a 60-day master plan forecast is used to set up cost requirements for the next 24 hours or, more precisely, correct such, necessary priorities, and a schedule pattern for the coming five days. This method has worked well as a maintenance tool. It lets each department and section know the plans of the rest of the group.

Overhaul is added by the fact that the closely assigned organization is all under one roof.

On the fourth floor of the main building is traffic operations control, on the third, operations, new and aircraft scheduling. The second floor houses maintenance production control. The production line organization occupies the ground floor.

All units are closely knit and well supplied with telephone circuits to their counterparts in the company's New York offices.

Zima mentioned a crew plan that Pan Am has to get more productive than cost of production workers. This program, recently placed in partial operation, involves two-man teams, each consisting of a mechanic and a stream deck, responsible for working in parts identification, emergency parts procurement, parts substitution and handling of all critical units.

The next step, says Zima, will be for each team, working under an assigned plan, to be responsible for obtaining parts for replacement on the job as needed. PAA hopes thereby to eliminate the many hours wasted each day by trips between job and part stores for parts. The company feels the scheme will work.

As interesting insight is that the base changes Pan American's Airlines and Latin American divisions and Pan Am for work done on their planes. The same is true of other lines whose craft occasionally pass through MOR.

The fixed price charge is predicated on the predetermined number of hours established for a given service or inspection. Major inspection items (such as fuel tank leaks) are billed separately. Prices are negotiated every 12 hours to keep them close to the break even point.

MOR is not as impressive. So is the efficiency with which the area operating this has under the management of Louis Goyers handle the continuous stream of aircraft aircraft inspection, maintenance.



MAMMOTH REFUELER

The M-1000 is the largest aircraft fuel truck in the world, according to Standard Oil of California, its designer. Just set in service at Honolulu International Airport,

### Changes Will Boost

#### Panagra DC-6 Speed

The latest four-engine propeller-driven commercial airplane in the world will soon be flying Pan American-Globe Airways routes, the airline claims.

A half-million dollar conversion program now underway involves converting propellers and propellers of its latest DC-6 fleet. The current Panagra Whitey K-2000 GA-15 engines will get way to the new, more powerful C-16 mounting the latest Hamilton Standard reversible pitch three-blade propellers.

Panagra says the engines, with additional water injection equipment, will put out 300 extra horsepower each at 2600 and 130 hp more of cruising speed.

The propeller, it continues, will give better climb, altitude and speed performance. Conversion will give five DC-6-15 ships over speed, according to Panagra. Other advantages is 25 percent increase in takeoff rate at sea level and maximum gross weight of 40,000 lb.

Reids/Scott's low tension injection system will be installed "to increase reliability and provide smoother performance."

The same comprehensive conversion will be installed on the two DC-6Bs ordered by the company for delivery early in 1962.

### Recording Camera

#### Withstands High G

A new aircraft instrument recording camera will be put into production next month by Gald Laboratories, 5264 Sunset Boulevard, Hollywood, Calif. The unit, called the AvioCam, is priced under \$1000. It will operate under acceleration loads of 30Gs in the vertical plane and 5Gs in the horizontal plane. A special "ThC" mode and clutch mechanism is available.

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#### The Wittek Type FB55 Aviation HOSE CLAMP

Utilizing the Wittek Flaring Bridge, the FB55 has been tested and proved for dependable service on all types of aircraft applications.



#### The Wittek Type WWD Aviation HOSE CLAMP

Available in all standard aircraft sizes, the WWD is also furnished in large diameters up to 12" for duct and other special applications. Permits easy installation when hose is in place.

Meet recent AIA specifications and meet CAA approval.

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## ENGINEERS' NOTEBOOK

Fast, efficient, positive attachment for hydraulic lines, wiring accessories.



Marmen support clamps perform an infinite variety of tasks. The top support clamp illustrated fastens hydraulic lines to the main landing gear on a large bomber. It is ideally suited for applications where a highly stressed mechanical part prohibits the use of welded lugs.

The clip support shown below accomplishes a similar purpose except that it holds hydraulic lines farther away from the strut and provides a lighter assembly with slightly less strength. Its use may be preferred where many such supports are required on one ship.



Throughout the airplane structure lag and clip support parts find many applications. Line support clips, wiring harness clips, attachment of ducting, are just a few of the many light duty installations for which they are suited.

By specifying a no. of the many highly adaptable standard Marmen designs, of which these are typical, you achieve significant savings in development and production costs. In addition you gain the benefit of maximum service tested performance.

**Save cost and design time with Marmen... Standardized Clamps for Specialized Applications**

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side for greater acceleration loads.

The camera was designed by H. G. Cunningham, Hollywood camera designer, and A. P. Nayher, formerly with Douglas Aircraft, who list the following specifications for the unit.

- Film size: 35mm with standard four-perforation pull down.
- Frame rate: Up to 5 frames per sec. on "interval" operation and down to 12 to 16 frames per sec. on "ciné" operation.
- Lens mount: Accommodates all Leica type lenses.
- Temperature range: -40 to +150 deg. F.

• Positive advance: A film-driven eventer pushes an electric cassette lever for each foot of film exposed. Cassette may be remotely located and initiates camera operation.

- Motor: Constant speed, operates from 20-Hz. dc. Others are available to operate from power sources ranging from pocket battery to 115-Hz. ac.
- Frame registration: accurate to 0.002 in. to simplify motion studies.

The makers say that maintenance and operation of the camera has been simplified as much as possible. All parts of the camera are readily accessible for servicing.

## Pakistan Orders Direction Finders

Three VHF Type AD 380 direction finders have been ordered by the Pakistan Air Force for use in navigational aids in that country.

The VHF ground equipment provides instantaneous bearing indication of two aircraft transmitting simultaneously on different frequencies in the 115mc to 135mc band, according to the manufacturer, Mason Wescor Telegraph Co., Ltd.

Measuring 6 in. in diameter and covering 360 deg., show either the true bearing of a plane from the station or the magnetic course which the pilot must take to reach the station.

## Better Antisip

Two new designs extend the use of the Fair F-8 autopilot to allow unlimited maneuverability and automatic target tracking, according to W. R. Lutz, who recently was awarded the Collier Trophy for research and development work on the F-7.

Automatic target tracking will be accomplished by coupling radar device to the computer of existing autopilot equipment.

Least pointed out that the electro-mechanical target will require the fighter pilot of much of the physical effort heretofore required in combat tactics.



present spaces. This applies only to the PF50-9115 pump as used on the Conquest.

## New Uses Seen for Goodrich's Geon

More widespread and important new uses of vinyl plastics in aircraft electrical equipment and other applications are predicted by B. F. Goodrich Co. as a result of development recently of Geon 404 by its engineers.

This is a high-molecular-weight polycarbonate resin that can be processed with wet plastering. It has the advantages

of high electrical, physical and chemical properties fused in one, assembled polyvinyl chloride—but not its drawbacks.

Briefly, Geon 404 overcomes the drawbacks. Polyvinyl chloride, explained, has properties that are superior to other plastics but it is dry and tough and hard to process in this condition. With a plasticizer added to soften it up, it can be processed easily, but then its physical, chemical and electrical qualities are impaired, making it an unsuitable for many high performance applications.

Unplasticized Geon 404 is the answer, according to Goodrich. It is



CONSOLIDATED FLIGHT PHOTO

## Wafer Kits Boost Pump Reliability

Victory fixed displacement hydraulic pumps equipped with metered valve plates for mounting the wafer kit modification are about five times as reliable as standard pumps, according to evidence published by the manufacturer (Aeronautics Week Nov. 27, 1958). They cost less to overhaul, too.

After 4300 hr. service accumulated on aircraft of various airlines, Victory says, the new type pumps have cost 55 percent less to overhaul. The first assets that when the Conquest 240 hydraulic valve supercharger drive was evaluated under test in 50 water jet on model PF50-9115 pump) no time parts failures had occurred on the former.

The major problems found were "worm cylinder block break caused by oil contamination from known sources."

Victory points out that 4300 hr. of supercharger drive operation is roughly equivalent to 83,000 hr. of main hydraulic pump operation because the former functions some 118 percent of flight time while the latter does only about 18 percent, an indication of supercharger drive components can be done in one month the time of an aircraft overhaul, including valve type hydraulic system.

To encourage Conquest 240 operation to meet themselves at the sales 30, Victory is giving them at no charge one kit per pump per aircraft plus 50

## More Aircraft Alloys & Stainless In Stock . . . Quick Shipment

Aircraft alloy bars, sheets and strips in more than 400 sizes, finishes and conditions are now on hand at Ryerson steel-service plants. And more than 300 different items of aircraft stainless are also available in bars, sheets, and strips.

**Now we are able—at this time —to offer enlarged stocks?**

Months ago when the expansion of aircraft production was first being considered, we began planning to carry more aircraft stock. Now the planning is beginning to show results. And as the aircraft industry starts a

program that will increase its capacity 16 times, our stocks now include alloy and stainless steels for aircraft parts manufacturers, air frame makers and engine builders conforming to all the widely used new MIL-S and AMS specifications now in effect. As additional products are covered by the new specifications, our stocks will be quickly adjusted to conform.

Ryerson plants are set up to meet aircraft steel requirements exactly; deliver them in a hurry, accurately cut to order. So tell us for your requirements. We'll get them to you fast.

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A large, stylized illustration of a hand holding a miniature model of a city, complete with streets, buildings, and cars. The hand is positioned as if presenting the city. A tag is attached to the city model.

**RUSH BY AIR**  
**ONE DIVISION**  
**OF DOUGHFOOTS**

**ONLY A FLEET OF C-124s COULD AIRLIFT AN ENTIRE  
INFANTRY DIVISION AND ALL ITS EQUIPMENT**

Quickly the giant Globemaster II breaks to a stop. Its clamshell doors fold back. Down comes the self-contained ramp. And seconds later battle-ready troops are pouring out of its spacious belly. Nearly other C-124s unload such directional equipment as M-24 tanks, 155 mm Long Toes, bulldozers, trucks and scrapers.

A fleet of these new Douglas transports could airlift all the personnel and equipment of an entire 16,000-man airborne division from Boston, Mass., to West, France, in a single flight!

Designed to meet the vital need for aircraft to support global operations, the C-124 has been ordered in quantity by the armed forces. Already a certain standard are in active service.

Over five years of careful planning and development work by Douglas and the military have made possible this revolutionary airplane. Such pioneering is typical of Douglas engineers, who are today turning their attention to advanced-type combat planes with jet, rocket and turbo-propulsion. Douglas Aircraft Company, Inc.

*Skilled engineers and technicians find Douglas a good place to work!*

DOUGLAS GLOBEMASTER II

*Depend on* **DOUGLAS** 

WORLD'S LARGEST BUILDER OF AIRCRAFT FOR 35 YEARS • MILITARY AND COMMERCIAL TRANSPORTS  
FIGHTERS • ATTACK PLANES • BOMBERS • GUIDED MISSILES • ELECTRONIC EQUIPMENT • RESEARCH

poor the high qualities of unprocessed polypropylene and is easily processed at the same time.

The company strongly emphasizes "high vinyl" resins based on 404 has electrical properties definitely as good as or better than those of plastic and polypropylene. "The material can be processed (extruded, extruded, molded) into "right" on conventional plastic processing machinery, adds the firm.

Besides much greater insulation resistance and dielectric strength compared to plasticized vinyl now used, 404 is more tough and sturdy. Conductivity tests indicate it has twice the deformation

resistance, about three times the tensile and compression strength and nearly four times greater resistance to tearing and abrasion than vinyl resins. It also has 20 impact resistance compared favorably with that of tough fibrous cellulose acetate.

Here are a few lightweight electrical applications that may develop for vinyl compounds based on Gens 404:

- Primary insulation on aircraft wiring eliminating need for jacket
- Jacket for coaxial cable
- Weatherproof line wire and take-back up wire insulation
- Bond sheets of Gens 404 can be welded by the hot gas technique, thus

fabricated into bonds, sheets or tubes for carrying conduits. It can be casted into bearings, valves, gears and other parts. And since it can be drawn and melted to reveal the finest detail, it can be formed for example, into topographical maps for military use, says Goodrich. Address: 124 Ross Bldg., Cleveland 15.

## Finishes Metal

A finishing process for aircraft fluid fittings, valves and other parts made of corrosion-resistant steel, is being offered by Asherco Equipment, Ltd., Santa Monica, Calif.

Especially strongly accepted and used by the Air Force, Navy and some manufacturers, the process is owned by Electro Polishing Co., Los Angeles, and is offered by Asherco after collaboration with this firm.

With chromate-chrome anode, AISI-100 Types, Austenitic, for example, the finishing process will accomplish the following, according to Asherco:

- Produce a chromate passivation
- Remove all welds, cracks, corrosion, and foreign matter
- Deburr and de-bore all sharp edges, including "orange peel" at thread roots
- Completely penetrate and refine surface stresses and strains
- Increase corrosion resistance 500-700 percent (conclusive tests by both military and manufacturers show this, not final and develop high layer polish, up to No. 12 mirror finish on clean metal)

## Protects Aluminum

As "Alodur" brand-on kit, containing sufficient Alodur to Alodize 1000 sq. ft. of aluminum in the shop or in the field is being offered by Alodur Chemicals, Inc., Ambler, Pa.

Designed to provide protection to both painted and unpainted aluminum surfaces against hand, mechanical and industrial atmospheres, the Alodur process produces a tough, skin-like coating that is highly corrosion-resistant and "sacrificially" holds "off" according to the company.

A big advantage that is claimed for the process is that it requires a minimum of equipment and skill—eliminating the need of high-temperature treatment or expensive electrical equipment.

With Alodur Alodizing compound liberally with the crude film coated by anode process and by cathodic chromate treatments, says the firm.

The "quick breakers" kit consists of a gal of ACIF "Dissolver," one quart of Alodur liquid and a 2½-ounce of Alodur Make-Up Powder.

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## A New Advance

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Basic Data

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Available in 10 types, 2.5 watt model

#### WEIGHT:

Equivalent of 10 types, 2.5 watt model

#### SHOCK RESISTANCE (per mil):

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#### TEMPERATURE RANGE:

Available in 10 types, 2.5 watt model

Plus than other important specifications:

1. Contact Rating: 2A, 25V, D.C., 2A, 115V, A.C., 400 cycle.
2. Contact Overload Rating: 12A, 25V, 70 sec.
3. Airframe Rating: Dry, inert gas, pressure filled, hermetically sealed.
4. Coil Resistance: 150 to 10,000 ohms.
5. Coil Voltage: 50 to 250V, D.C.
6. Terminal Arrangement: soldered connections, plug-in approach.
7. Mounting: Versatile.
8. Verifications: Visually inspectable, in voltage, impedance, number of poles (4 maximum) and temperatures.

To meet existing requirements of missiles, rockets and other air, ground, and marine applications, this new relay incorporates a hermetic-wrapped combination of characteristics. The combination is achieved through several unique design features developed by The Elm Manufacturing Company, producer of dependable electronic controls and devices for more than half a century.

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## NEW AVIATION PRODUCTS



### Small Fuel Booster

A lightweight uncharged type fuel boost pump, designed specifically for small planes and helicopters, now is being manufactured by the Adol division of General Motors Corp.

The compact, super-boost pump has a maximum output of 40 gpm and a discharge pressure of 11 psi. The unit will operate through an ambient temperature range of -65 to 160F. It has an integral relief valve that is adjustable between 3 and 12 psi. The relief flange discharges pressure

to a maximum of 2 psi above pressure at rated flow. Through the bypass check valve, pressure drops to one inch mercury at 50 gpm. The pump operates on 12 and 24v dc electrical systems, draws 2 to 4 amp, and weighs 2 lb 7 oz. Address: 10775 Van Owen St., Burbank, Calif.

### Tones Down Jets

One way of quieting the roar coming from jet engines test cells during run-up periods is by using B&W Intertuning Filters.

According to the maker, Babcock & Wilcox Co., its K 26 filterbank, normally used for high temperature applications in industrial furnaces, has been installed by General Electric Co. to cut down noise on 14 jet engine test cells at GE's Lockland, Ohio, plant.

B & W started adding its product for this purpose after tests showed it had "natural" sound-absorbing properties as well as resistance to high temperatures.

At Lockland, sound is reduced so that at a short distance from the plant it is no louder than a noisy office, says the

company. In each cell, air is admitted through one end of the ductwork, passes through and around the engine and is ejected along with exhaust gases through a steel pipe which runs part of the length of the cell and makes a right angle bend to go up 20 ft into the exhaust stack. The exhaust stack is 50 ft high with an inside diameter of 64 ft. It is this area which is lined with specially treated insulating feltwork. Exhaust gases passing through the stack may reach 900F. A strong point for the filterbank is that it absorbs sound efficiently over a wide range of frequencies, the maker says. Address: 85 Liberty St., New York 6.



### High-Speed Motors

A new addition to the line of fractional horsepower electric motors pro-

duced by John Oster Mfg. Co., Inc., is a 400-cycle motor designed by the firm as "especially suited to speed setting for high speeds and plenty of power."

This lightweight motor equipment is available as a capacitor run single phase or polyphase induction motor. Typical construction data: output is 1/100 hp at 7000 rpm on 400c, current is 1/140 amp at 1900 rpm on 60c current. The motor is located at Buena Vista, Wis.



### Finger Sheet Clamps

"Interlock" sheet clamps, already proven as production lines in England, now are being introduced to this country by Air Associates, Inc.

Clamps can be compressed by hand for tension into sheet metal holes—no jacks are used—and the clamps, properly aligned, tension or expand sections, sheets can be drawn together by fingertip action when the clamp has been inserted.

Air Associates says these clamps permit speeding of assembly operations for erecting other greater clamping strength, have a high safety factor, are vibration proof and can be used with a wide range of material thicknesses.

For extra safety, the clamping and loosening of the nut hole rather than only a few thousandths of an inch, the company explains.

The interlock sheet clamp consists of a completely enclosed steel spring (1), cylindrical sleeve (2), clamping nut (3) which rides on a tapered portion (4), clamping rod (5) and slider (6). Address: Elizabeth, N. J.

### ALSO ON THE MARKET

Thermal time delay relay, heretofore unobtainable, but designed to permit adjustment of the time interval, its seven pin connector hole surface on output leads, measures 1 in. dia., 3/8 in. spaced height.

Trough, range up to three minutes available, weight from 1.5 to 2.5 oz., depending on mounting arrangement. Made by G.V. Conroy Inc., 25 Hollywood Plaza, East Orange, N. J.

Coolest pump and tank can be used with thick wet, molasses fuels, meets needs of multiple-specific drill pumps up to eight cylinders. Adjustable pressure directs and controls coolant flow as desired. Several pump models available deliver 6 to 12 gpm, no piping required between pump and 16-pit tank. Made by Delta Power Tool division, Rockwell Mfg. Co., Milwaukee, Wis.

Portable furnace for lingers, shops and other industries requires no inside stock, can be operated simply by throwing switch, after connecting to 110v, a electric, attaching hose in down carrying No. 2 grade oil and keeping up the oil level. Made by Great Automatic Oil Burner Corp., 73 Broadway Ave., Newark 4, N. J.

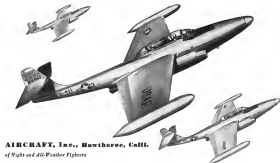
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## AIR TRANSPORT

### CAB Role May Hinge on New Chief

Strength and independence of Board seen depending on strength of Chairman; Nyrop appears the favorite.

Future of the Civil Aeronautics Board had a lot of questions remaining a last week but most of them could be answered fairly clearly by the announcement of a new CAB chairman at the request of Elder W. Rosten, who is to become Undersecretary of Commerce for Transportation (see story page 13).

The most likely prospect to take the place of Rosten, as the last both of qualifications and acceptability to the Administration, likely, was Donald W. Nyrop, now CAA Administrator. Nyrop, a Norwegian, was once a senior to the CAB Chairman, when E. Walsh Page held that office. Nyrop also had a long background and served as the CAB general counsel's office when Page was general counsel before he became board chairman.

Various Trade-Labor Nyrop served with Air Transport Committee during World War II, then at Air Transport Assn., and finally returned to government work, as assistant to Rosten, then CAA administrator. When Rosten retired as the board chairmanship, Nyrop moved up into the top spot at CAA, succeeding him. The two men have continued to work closely together in Air Coordinating Council and as heads of the two big federal aviation agencies.

Selection of a well-regarded chairman as considered by aviation observers to be almost a prerequisite if the board is to continue as a strong independent organization. And it is understood that President Thorens has indicated that he wants it to continue strong and independent.

Interpretations that the new man powers for the Undersecretary of Commerce for Transportation, senior position for the CAB are being dominated by industry sources as far as initial positive reactions of the board are concerned. And theories abound about cutting down the size of the board to perhaps three men, are not confirmed by the recent resignation of a new fourth member of the board, to succeed a member who has retired—former Senator Chris Chavira replacing Harold Jones.

Only two members remain who were members of the five man board as recently as two months ago. They are former Chairman Oswald Renz and Jack Lee. To these are added the se-

veral appointees, Joseph Adams, who joined the board in January.

► **Chairman Awarded—Former Senator** Chavira, appointed for the fourth place on the board, is expected to be confirmed. And Chris Chavira, complete, the board senior except for the chairman, who will succeed Rosten.

Timing of the whole sequence of appointments is somewhat held up pending the action on the appointment of Mr. Gen. Philip H. Frank, currently Undersecretary of Commerce for Transportation, who is to become ambassador to Costa Rica. Until Frank's appointment is completed, the sequence of moves involving Rosten and his successor in CAB chairman, cannot be stated.

Washington observers are confident that the newly defined CAB policy outlined over the past two years will last through this most recent series of personnel changes.

The personnel staff of Board members, and presumably also the staff of the President, may effectively prevail on the changes in policy and action. The policy planning group of top staff experts is made up of Walter H. Board, chief of Accounting and Statistics Division, Harold Selton, chief of the Bureau of Aeronautics, Frank J. Cruise, consumer affairs in the board, and Robert J. G. McClinton, special adviser to the board. The continuing policy planning and advice of this group, as well as the rest of the staff circle, should mean more continuity of CAB membership at the Civil Aeronautics Act.

► **New Status—Now more than ever** the chairman of the CAB is important, if not a critical, role. Under senior position reorganization the CAB chairman has become directly responsible for all maintenance of the staff, so that he now holds considerably more control than he used to in nearly the 1940s (though slightly earlier) Board members.

### Continental Asks O.K. On Mid-West Purchase

Continental Air Lines has asked the Civil Aeronautics Board to approve its purchase of the "local service airline," Mid-West Airlines, Inc. At the same time, Continental confirmed its order

for seven new Convair Linc 340s, with option to buy three more.

Continental will use DC-8s on Mid-West's routes instead of the present single-engine Convair. Added cost will be \$60,000 annually, says Continental president Robert E. St. Another \$400,000 will go to establish service on other proposed routes to Chicago from Minneapolis and St. Paul via Milwaukee, Rock Island, East Moline and Danbury.

President St. says using late DC-8s will expand service on the new routes for years over present levels.

Continental said Mid-West also asked CAB to approve an extension of its Denver-Minneapolis route. But Mid-West's routes to Denver involve a headquarters and operating base for Continental. They also want CAB to extend the term of Mid-West's operating permit, scheduled to expire this June.

► **Now This Free—Continental now has five 40-passenger Convair-Linco, 21 DC-8s, plus the ten 41-passenger Convair-Linco on order or option. Reports say that Continental plans to continue its option for all ten.**

Cost of seven Convair fully equipped for Continental is \$4,190,000, or about \$614,000 each.

Continental and Mid-West say Continental's present maintenance, operations facilities and administrative personnel will be utilized more after taking over Mid-West. Thus, they say, will follow Continental to reduce its operating costs approximately \$400,000 annually.

Continental's present system serves 13 cities with population of 5,541,234, as the states of Colorado, Kansas, Missouri, New Mexico, Oklahoma and Texas. The two airlines together would have 61 cities with total population of 6,319,051 and total routes of 4100 miles.

### 2 de Havilland Doves Ordered by Wiggins

First U.S. airline purchase of a British-made jet, de Havilland Doves, with announcement of de Havilland Wiggins Airways that it is buying two 18-passenger de Havilland Doves for delivery this spring. Wiggins also has its system to buy several more Doves if they are available.

Wiggins depends mainly on the Civil Aeronautics Board action as Wiggins' request for New England-New York City service via Pittsburgh. Wiggins' service pattern now is Boston-Albany with 50 intermediate stops along the route.

Original negotiations with de Havilland were mostly settled last fall (see AVIATION WEEK, Oct. 31, 1958). But

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Wiggins has had to wait for more favorable treatment before going ahead on the deal. With medical CAB approval, Wiggins now feels it can secure purchase of the Dove—a medium short-haul transport.

Wiggins has only six twin-engine Cessnas. They carry 4 passengers plus one pilot. The Dove carries 10 passengers plus two pilots. It cruises at about 170 mph.

## Eastern Asks Martin For 25 More 4-4-4s

Eastern Air Lines is ordering 25 more Martin 4-4-4s in addition to the 35 already ordered from Glenn L. Martin Co.

The 25 planes cost \$39 million fully equipped. Eastern bought them under the option to buy more 4-4-4s at the original price, as stipulated in its first contract.

This makes an even 100 Martin 4-4-4s on order—60 for Eastern and 40 for Trans World Airlines.

Delivery schedule for Eastern's new 4-4-4s is original 35 start deliveries this summer, with all 35 delivered by March, 1952, next 25 start in April, 1952, and complete by July—about 34 years from now.

The new equipment will help Eastern overcome its equipment shortage on short as well as long runs. January traffic was up 51 percent over last year. And the second half of 1950 was 39 percent over 1949. Eastern plans to replace its DC-3s with the 4-4-4s.

## CAB Eases Nonsked Regulations Slightly

CAB last week took the necessities they could by any number of military contract flights in the next six months. Flight to major cities are still restricted to those a month. Puerto Rico flights must not exceed eight a month.

CAB named Air Coach Transport Area, and Independent Military Air Transport Area, as service agents for military contracts.

## Commercial Pilots Get Draft Delay Priority

Commercial pilots now have high priority for deferment from military service—even when they belong to military reserve units. The job of "update 144, commercial" is one of only 35 jobs on the Labor Department's list of critical occupations.

Some pilots in the service were uncertain as they shirked.

Air Force policy authorities granting

delays to five categories of military pilots are now in category A, which is for "a person principally employed or engaged in a critical occupation in an essential activity."

Original criteria list, made up by the Labor Department last August, held 48 jobs. Now there are 56.

Delays of "update 144, commercial" include pilot, copilot, check pilot, pilot instructor and pilot being experienced transport and military aircraft.

## Push for Single Transportation Body

The push for a single transportation regulatory agency will get underway in the Senate in a week.

Legislation rewriting the 1940 Transportation Act and setting up a National Transportation Commission, drafted by the staff of Senators and Foreign Commerce Committee, is being reviewed by Chairman Edwin Johnson and Sen. John H. Rankin. Johnson originally planned to introduce the measure for purposes of hearings. "But I am so much opposed to the single agency idea, that I might dramatize this position before introducing it," he told Associated Press. The Chamber of Commerce is expected to adopt the recommendation of its transportation committee for a single agency. Airline members of the committee dissented on the measure.

## Egypt Aids Native Airlines

(McGraw-Hill World News)

Cairo—Two Egyptian airlines, Mena Air and Suez Canal Airways International (Dagair), serving Northeast Africa, the Middle East and Southern Europe, have received approval of the Egyptian Chamber of Deputies for supplementary capital of \$170,000 for past services rendered.

The government is also relaxing Mena Air's payment of customs duties on fuel and aircraft oil. Oil required for the airline's regular services and for training and flight tests will be taken from bonded stocks. Oil used for charter and other private flights will be paid for at the end of each month on the basis of a written guarantee from Mena Air of the amount used.

Mena Air is a subsidiary of the giant Banque Misr, which has developed much Egyptian industry with government sanction. SAHME is a private airline carrier, partly financed with Italian capital, which began operations three years ago.

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## THE PLANES

that had sent war material and passengers to Korea. Inside clustered soldiers, such as the Flying Tiger Line DC-4 waiting up at left, and MATS C-124A Conquest and C-54 Skyraider lined up alongside.



## THE PROCESSING

of military personnel being flown to the Far East began at Tamm.

## Airlines—MATS Team On Vital Korea Airlift

The crowded ramp at Tamm AFB, Calif., marks the eastern terminus of a 7,000-mi. aerial pipeline from the U. S. to UN forces fighting in Korea.

From here go the chartered DC-4s of Jeppia and U. S. airlines and the Skyraiders, Globemasters, Stratofreighters and Conquests of MATS carrying high-priority passengers and fighting gear, vital medical and blood plasma. Increasing planes bring battle casualties, evacuees, captured enemy equipment and other urgent loads.

Commercial routes include Northwest Airlines, United, Pan American, Seaboard and Western, Transconair, Flying Tiger, Overseas National, Alaska, California Eastern, Canadian Pacific and Sabena.



## THE PASSENGERS

waiting after, carbons and hand luggage, line up by a chartered Transconair Air Lines' DC-4.



## THE EVACUEES

When men and children of men ordered to Korea,



## THE RAMP

at Tamm AFB, Calif., is spotted with transport used in the airlift. At left is the low-loading MATS passenger transport.



## THE BLOOD

needed for battle casualties is trucked into a MATS Boeing C-74. The human whole blood is refrigerated, gets to Korea in 48 hr.



## THE WOUNDED

are unloaded from a Stratofreighter at Tamm. Formerly Pan Am's Boeing 478 is used as an air-conditioned 30-bed ambulance.

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## PanAm Flights EAL Puerto Rico Award

Attack on the new Civil Aeronautics Board 1951 route policy and actions as inconsistent is made by Pan American World Airways in a petition to the President and the CAB. PanAm urges them to reverse their recent approval of Eastern Air Lines service New York-San Juan.

CAB, in recent policy statements and in the Southern Service to the West decision, and it would work for more intensive self-sufficiency by cutting possibly disruptive competition. Yet CAB in its first two important route cases in 1951 has granted Eastern a long, new route New York-San Juan, in direct competition with PanAm's existing service on the same route. A few days later CAB refused to allow a new transcontinental route giving southern service to the West, instead the Board ruled for interchanges services over existing route segments, to avoid any new competition.

PanAm claims Eastern Air Lines' representation on the New York-San Juan can will cause PanAm, used \$7.5 million more mail subsidy per year.

Pan American now adds an \$11 or 15-percent fare reduction to 564 one way fares to New York-San Juan, to meet Eastern competition. At the same time, PanAm adds summer excursion, first-class, roundtrip fares of \$118.00, New York-San Juan, and \$108.15, Puerto-San Juan, effective April through October.

## Simplify Direct Flight By Air Taxi, Airline

A traveler flying near an airport served by a scheduled line, may enjoy flying now by direct to any city. The local "air taxi" will both fly him to a connector with scheduled airlines and arrange his connections.

This is the result of an agreement between 23 scheduled airlines and the members of the National Air Taxi Conference. In many cases, the local operator will quote the traveler a lower price for both air taxi and through scheduled tickets.

This method will simplify air travel for some customers, in other helping make airports closer to their homes.

Among the small irregular carriers who have signed this agreement are Aero Service, Air Service, Aviation Center, Central Flying Service, Clinton Aviation, Dixie Air Associates, Elliott Flying Service, Parker Aero-Mechanics, Red Bank Airport, Rockland Aviation, Sky Travel, Southern Flight Service, Van's Air Service, Western Airport, Wiggins Airways, and Wings, Inc.

## SHORTLINES

► **Air Transport America—Airlines** will spend \$100,000 preventing an payroll post and mail this year—same as last year.

ATA, taking CAB for the right to get on the island and Western Air Lines made the case in "board of the court" ATA denies the airlines in their claim that profits from sale of a route are "other revenue" and do not bear on mail rate determination.

► **American Airlines**—A good public relations job by a stewardess starts paying off for AA this month. The MGM comedy movie "Three Girls Named Nina" released to the public this month is based on American Airlines stewardess' experiences and airline operations. Stewardess Ethel Wells told the story to a movie director passenger on her flight one night, by describing some of the humorous incidents and the safety atmosphere of airline life. She became national advocate on the film production.

► **American National Airways—ANA** earned over 30,000 tons freight in 1950—34 percent more than 1949. ANA uses the Bristol freighter, averaging 11,000 in a load, and handling with bag from opening doors, has helped the first freight revenue to one-third revenue of all kinds.

► **British Overseas Airways—BOAC** air freight increased 40 percent in 1950—5100 tons compared to 4000 tons. Trans Atlantic BOAC freight, open from 1949, gained 100 percent in 1,315,215 lbs.

► **Dublin Airport—Dublin** was the busiest airport in the British Isles in 1950—total of 237,175 passengers on 19,518 planes. Top monthly, August, 40,000 passengers used the airport.

► **Eugene Aero Inter-American—His** new Maeco service by RAA is granted by CAB in April, 1951.

► **Lima—Columbia** airline separately may get help from American—may join Avianca to avoid financial trouble.

► **Northwest Airlines—CAR** denies Northwest permission to stop serving Reno-Town, N. D., and Bozeman and Chicago, Minn., without formal hearings.

► **Pan American World Airways—Pan** Am wants the CAB to hurry up separate hearings for its Panago-Panama non-stop flight proposal. CAB has no



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## WHAT'S NEW

### New Books

The growing trend towards use of alternating current systems for large aircraft makes the appearance of the second edition of **Alternating Current Electrical Systems for Aircraft** (16-3464) of timely importance. The volume contains the latest design criteria, maintenance basis and uses of these air systems.

Stressed on special application problems inherent in high altitudes. This expanded edition contains a new transformer chapter, up-to-date chapter on circuit breaker and relays, data on antennas and power cables, variable frequency systems for radio, radar, window heating, surface anti-icing, lighting and galley loads.

Available from the Westinghouse Electric Corp., P.O. Box 2079, Pittsburgh 30, price \$1.50.

In **Aircraft Designer's Data Book**, author Leslie E. Neville has compiled nearly 300 illustrations and sketches of aircraft design details—arranged in chapters corresponding to the structural basic components—into a very comprehensive study that should be a distinct aid to designing engineers what has already been done in their particular fields and how rapidly it has advanced part engineering handbooks. The volume should also be of great interest to the fledgling.

Author Neville, for many years editor of *Aviation* magazine, and now with Curtiss Wright Corp., used his experience to present his material in a clear, concise and sequential order. The text of the volume, approximately 94 by 114 in., presents a format allowing attractive presentation of drawings, cuts and text of sufficiently large size to assist their effectiveness.

Published by McGraw-Hill Publishing Co., Inc., 310 W. 42 St., New York 36, 534 pages, including index, price \$10.

The 1950 **Aircraft Yearbook**, 12nd official annual publication of the Aircraft Industries Assn. has been published by Lincoln Press, Inc. Book edited by Fred Shindler, has its usual statistical tables and reference department, such as new things in the air, plant in production, exports in production, 1949 day by day chronology, aviation records.

Book directory indicates the new edition is in ready stages an improvement in accuracy over the 1949 edition. Yearbook is obtainable from Lincoln Press, Inc., Warner Bldg., Washington 4, D. C., for \$6-A. M.C.

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*Illustrated above—Grumman F9F-3 Panther, Lockheed F-80 Shooting Star, Republic F-84E Thunderjet*

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